

Audio Research *Reference 160M* Monoblock power amplifiers

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 HIFICRITIC
AUDIO EXCELLENCE

The build history for US valve-tube amplifier manufacturer Audio Research goes back to the early 1960s: it has experience in spades and the more recent commercial association with the McIntosh group does not seem to have diluted the designers' enthusiasm for their craft.

I could wax at length about this latest model's illustrious forebears and could mention owning more than a few examples some years ago, but instead will start afresh: reinvented philosophically and technically in recent years, Audio Research – while focusing on the positive subjective sound qualities of valve-tubed electronics – has also embraced modern practice, not least to meet EU specifications for chemical hazard, excess temperature, and standby power drain. It's not easy to satisfy these requirements and continue to lift sound, and inevitably the cost increases, so it is fair to describe the *Reference 160M* monoblock pair as a flagship, priced at some £30,000 in the UK.

Our examples needed some running in: they were brand new, DPD having mislaid the official review set. However, tried new out of the box on arrival, after just a few tens of hours' warm up back at base, there were no complaints with the sound, though they certainly continued to improve subtly during the extended review period.

Installation requires some thought, for example regarding location and cabling, the latter including the loudspeaker cables, double mono interconnects (preferably balanced), and 2x20Amp power connections. Then there are the physical support and vibration countermeasures to be chosen, from which valve /tube products may particularly benefit due to residual microphony.

Extensive supplies of fresh Transparent *XL Reference* cabling were provided to join it all up for review, supplementing our reference stock, and composite glass/stainless steel and spiked floor stands by Artesania provided support. From the factory the valves/tubes are packed separately and need to be installed, but when dealer supplied this will be done before delivery to the customer.

There's a further consideration: due to the significant heat dissipated in the amplifiers there is automatic variable speed fan cooling, and it is recommended that the room ambient temperature shouldn't exceed 30 °C, meaning really warm locations will need air conditioning.

The power consumption in various modes is fully specified: 1W per channel in standby, 260W 'on' and ready to go, 400W at rated output of 2x150 W ultra linear mode and some 700W short term draw when driven flat out, here taking advantage of some of the extra headroom often available with vacuum tube designs. This power reserve partly explains why these amplifiers play louder than you might expect on music maximae.

A central transparent acrylic front panel, in dim light rendering the glowing valves visible, is edged in black framing matching that of the *Reference Six* control unit, and distinguished by a huge, old style analogue moving needle 'power' meter. This may be set to various approximate power modes and illumination levels, though the indications given are partly fictional, more for fun than to provide a reliable view of power delivery.

Unusually for a power amplifier, there's a number of controls in addition to power on/off, touch-switches actuating a microprocessor that appropriately sequences the commands. The most interesting is the choice of output mode, between full-power or triode operation: the switch is illuminated in pale green for ultra-linear operation, and a subtle blue white for 'triode'. The former uses moderate negative feedback taken from taps on the output transformer primary winding back to the screen grid of the respective tubes, and results in lower numeric distortion and higher output.

In the triode mode this tap isn't used, and the 6550 tetrodes are then wired as simple triodes, of lower efficiency but also with naturally lower feedback and – when driven hard – potentially a more musically mellifluous form of lower order harmonic distortion. Rated output in triode mode is 3dB less at 75W, rather than the 150W possible for U/L operation. There's some negative feedback, but this is kept low, at 14dB, to maximise sound quality.

Which to use? It's a matter of taste: you might, for example, at different times take U/L for flat out rock and triode for acoustic jazz and classical music.

Three options for loudspeaker matching are offered by the output transformer secondary, which feeds the heavy duty binding posts for 4mm and spade connectors. 16, 8 and 4 Ohm settings are available, and with these come changes in rated output power which are also to some degree interdependent with the typical loading.

You may experiment with these according to taste: for a 4-8 ohm speakers the 8ohm tap in ultra-linear gives the most headroom and all out slam, while the 4ohm tap in triode mode gave the sweetest and most naturally dynamic classic valve sound.

The *160M* has automatic biasing (for idle current) and requires no adjustment: tubes are run within their ratings and the four KT150s per channel are typically good for 3,000 hours, while the two 6H30 drivers are rated for 4,000 hours of use. There is an elapsed hours of use indicator on the rear panel which may be reset after servicing and/or re-tubing.

Replacement tubes should be to selected Audio Research specifications for correct bias – fortunately these are not too costly and, with individual serial numbers on each tube, if one fails prematurely the company can provide a matched replacement. The design is said not to benefit from the use of super selected or similar NOS tubes.

On the back there are switches for auto shutdown when the amp is left idle for a period; for the two fan speed settings; and for choosing between balanced and single ended inputs.

Compared with previous versions the power supply is now solid state with very good regulation

claimed, for lower noise floors and ‘faster’ bass. The amplifiers measure 17.25” (or 43.8 cm) wide by 18.5” (47 cm) deep, with the handles adding an extra 0.75in (or 1.9cm). They stands 10” (25.4 cm) tall, and need clearance for good ventilation, and weigh 56lbs (25.5 kg) per channel; each is 73lbs (33.2 kg) when packaged for shipping.

Sound Quality

The amplifiers were used very successfully with both *Magivo S5II* and *Wilson Sasha DAW* loudspeakers, these two representing fairly tough loading, and right away this double-chassis power amplifier demonstrated a lively, punchy character with expressive dynamics.

Clarity was very high, revealing much in the programme sources, including sparkling detail and crisp transients combined with massive stereo soundstages, the latter deep, wide and very well focused. Images were beautifully layered in depth, with a highly detailed recovery of low level detail and atmosphere, and vocals were nicely articulate, full of presence yet not overblown.

In the bass, the *160M* sounded as capable as many good solid state designs, but with an extra



quality, a kind of punchy sweetness which was especially evident with acoustic double bass, judged especially natural. It worked very well with the *REF 6* triode preamp, clearly a natural companion, but I also felt that you could invest still more in the preamp if desired, so good are these power amps.

Driving the *Magico S5II* there was substantial neutrality but also an upbeat degree of pace, with very good bass timing and articulation, a sweet midrange for natural vocals with delicately phrased trebles. With the *Wilson Sasha DAW* the near 4dB increase in sensitivity brought a significantly greater dynamic range, which was impressive via the 8ohm tap, and when using the 4ohm tap a most pleasingly synergy was found. Somewhat depending on the programme choice, triode mode was generally preferred for its greater fluidity and naturalness, while heavy rock benefitted from the extra sense of grip and power of the ultra linear connection.

Conclusions

This valve/tube amplifier is powerful and essentially load tolerant, so well suited to high-end audio systems. While that visually dominating power meter on the front panel is quite inaccurate, all else found in this design operated to a high level of dependable precision, and the lab test report showed that it met its claimed specifications well.

Audio Research power amplifiers have continued to improve, and the *Reference 160M* is a very fine example, providing excellent musical entertainment over the review period. Undoubtedly HIFICRITIC Audio Excellence, our strong recommendation comes without any question of a doubt.

Lab report

On the 8ohm tap in triode mode, 0.7v input raises 75W with 3% harmonic distortion, this of the innocuous, kinder-sounding low harmonic order, and contrasts with greater 2.2V input required in ultra-linear mode. Here this input delivers a 125W maximum at a lower 1% of THD. The output impedance is quite high, as the open circuit voltage maximum would equate to 250W for a nominal 1% distortion, this an indication of the 'softer' output regulation often found with valve/tube designs.

Regardless of selected output mode, the output impedance is fairly low at about 0.75ohms, and is desirably stable with frequency. Some loudspeakers may show a small increase in bass level with the *D160M*, suggesting a small compensating shift in enclosure location relative to nearby room boundaries, although with both the *Magico S5II* and the *Wilson Sasha DAW* I found no need to adjust the loudspeaker locations. What's more, the



frequency response at 1W was very similar for 4 and 8 ohm loading – e.g. -1.8dB at 20 kHz: perceptibly 'sweet', if only just – and was less than 0.15 dB down at a desirably low 20 Hz.

At 1 kHz total harmonic distortion was an 'only just audible' 1% at full power and is typically below 0.04% at 1 watt, a fine result and inaudible. There is no concession in respect to power bandwidth, with very wide 5Hz to 70 kHz -3dB points. At 1W we noted an excellent frequency response, 0.5Hz to 110 kHz, -3dB, uniform between these extremes.

A 2.4V balanced input gets full output, the amplifier providing a voltage gain of 25.5dB, combined with a desirably high input impedance of 200k Ohm balanced (100k SE), barely loading the preamplifiers used with it.

The damping factor is rather oddly specified as '14 for a 16ohm load' and this will be about '5' for a normal 4-8ohm load. The timbre of a given loudspeaker will be slightly modified with this value of source impedance, in common with many examples of the genre. However hum levels are very low, e.g. at 1W the full bandwidth signal to noise ratio was very good at 88.6dB.

Fascinatingly, distortion results for triode and ultra linear working were very similar: for example at 50 W for triode 20 kHz it was 1.5% and for UL, 1.3%; at 20Hz it was 0.37% and 0.33% and 1 kHz 0.45% and 0.45%. Distortion was found to decrease progressively as the output was reduced: for example, 10W in triode mode gave better than 0.1% distortion over the whole frequency range, from 20Hz to 20 kHz.

This is clearly a well-designed power amplifier.